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(54) Title: **RFID RECYCLING SYSTEM AND METHOD**

(57) Abstract: A recycling method for reusable product identification devices is provided which includes: monitoring sales of products having reusable product identification devices; determining, based on monitored sales, when the product identification devices should be returned to a party; monitoring the return of the identification devices; and performing accounting functions in connection with the return of the identification devices. The identification devices are preferably RFID tags or devices. A redemption center is used to sort the RFID devices by owner and return the RFID devices to the rightful owner for reuse on other products.

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TITLE OF INVENTION

RFID RECYCLING SYSTEM AND METHOD

FIELD OF THE INVENTION:

This invention relates to the field of retail sales and electronic registration of sales transactions. More particularly, this invention relates the use of RFID devices on products, and a method of recycling RFID devices for repeated use on products, as well as accounting for the return of RFID devices to the rightful owner.

BACKGROUND AND SUMMARY OF THE INVENTION

RFID devices have existed for some time and have provided a convenient way of tracking products as well as uniquely identifying products. An RFID device is a small electronic device having a memory that can be attached to a product in order to enable electronic identification of the product. Identification information, such as a serial number, as well as other information can be written to the RFID device and later read from the device when desired. RFID devices can, for example, be used in connection with inventory tracking or other applications in which it is desired to maintain information regarding the product on the product itself. Typically, RFID devices are loaded with information relating to the product and then attached to the product, so that the information can be read, updated or supplemented as desired using available RFID reading and writing equipment. Examples of RFID devices are shown in U.S. Patent Nos. 5,990,794 and 5,949,335, the disclosures of which are incorporated by reference herein in their entirety.

Recently, electronic registration of product transactions has become available for the purpose of reducing unauthorized returns of purchased products. Electronic product registration systems provided for this purpose are disclosed in U.S. Patent Nos. 5,978,774, 6,018,719 and 6,085,172, the disclosures of which are incorporated by reference herein in their entirety. The electronic registration system relies on the use of a unique identifier, such as a serial number, for each product that is purchased. The serial number is obtained at the point of sale for inclusion in a registration database, together with other information, such as a date of transaction. This database can then be accessed in connection with an attempted product return transaction for the purpose of determining if the product qualifies for return under applicable return criteria. Such electronic systems may also be used in connection with repair and/or exchange transactions, in addition to returns, by enabling an accurate determination as to

whether the product qualifies for any of these actions under the appropriate policies and criteria under which the product was originally sold.

While RFID devices and electronic registration systems have provided significant benefits in the retail/manufacturing environment, there has not been an effective system that 5 takes advantage of both of these technologies. Moreover, due to the fact that RFID devices can be expensive, a need exists for an efficient and accurate method for recycling RFID devices for repeated use on products, while also enabling electronic registration to be used in connection with the products.

The instant invention addresses these problems by providing a method and system that 10 enables RFID devices to be recycled and reused. Specifically, the invention provides a method wherein RFID devices owned by vendors (or third parties) can be efficiently and properly returned to the vendor after a vendor's product has been sold at, for example, a retail location. In addition, the invention involves reading of product related information, such as serial 15 number and/or any other desired information that has been written to the RFID device, from the RFID device at the point of sale location in order to obtain required data and optionally other desired data used in connection with electronic registration of the product when purchased.

In accordance with a primary aspect of the instant invention, a recycling method for 20 product identification devices is provided. The method includes: attaching detachable product identification devices to products, wherein each identification device contains machine readable data that uniquely identifies the product to which the identification device is attached; shipping the products having the identification devices thereon to a sales location; removing 25 the identification tag from purchased products at a time and point of sale; reading data from the identification device and using at least some of the data in connection with electronic registration of the product sales transaction; sending removed identification devices to a service location; sorting, at the service location, the removed identification devices into a plurality of batches of identification devices, wherein each batch is associated with a respective party; sending each of the plurality of batches of identification devices to the respective party to which the batch is associated; and reusing the identification devices in connection with other 30 products.

In accordance with another aspect of the invention, a recycling method for reusable product identification devices is provided which includes: monitoring sales of products having reusable product identification devices; determining, based on monitored sales, when the

product identification devices should be returned to a party; monitoring the return of the identification devices; and performing accounting functions in connection with the return of the identification devices. The identification devices are preferably RFID tags or devices.

5

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects, features and advantages of the instant invention will become apparent from the following detailed description of the invention, when read in conjunction with the appended drawings, in which:

FIGURE 1 shows an overall schematic diagram of a typically electronic product
10 registration system that can be used in connection with the RFID recycling method of the instant invention;

FIGURE 2 shows a general flow chart of the main steps performed in accordance with a preferred embodiment of the RFID recycling method of the present invention;

FIGURE 3 shows an exemplary flow chart of the main steps taken by a product vendor
15 or manufacturer in accordance with a preferred embodiment of the RFID recycling method of the instant invention;

FIGURE 4 shows an exemplary flow chart of the main steps taken by a retailer in accordance with a preferred embodiment of the RFID recycling method of the instant invention; and

20 FIGURES 5A and 5B show exemplary flow charts of steps taken by an RFID redemption center operating in accordance with the preferred embodiment of the RFID recycling method of the instant invention.

DETAILED DESCRIPTION OF THE DRAWINGS

The preferred embodiment of the instant invention will now be described in connection
25 with the appended drawings. The described embodiment is not meant to limit the invention to the specific details described herein other than as required by the claimed invention.

Figure 1 shows an exemplary electronic registration (ER) system of the type described in the ER patents identified above. In such ER systems, products are registered at the point of sale using a unique identifier, such as a serial number, that uniquely identifies the product
30 involved in a sales transaction. By storing the unique identifier along with a date associated with the transaction, as well as return policy information, ER enables prompt, efficient and

accurate return transactions to be performed in connection with product returns using the ER system.

As shown in Figure 1, a typical ER system includes a point of sale (POS) transaction register 2, preferably having a scanner or wand 4 associated therewith. The scanner or wand 5 enables efficient and accurate reading of information, such as a serial number, off a product, product packaging, electronic tag (such as an RFID tag) or other such device or indicia. The register 2 is connected to a local computer system 6 having local database 8 for storing the transaction information obtained by POS register 2. The local computer system typically has a user terminal 12 and printer 10 connected thereto for accessing and controlling the local 10 computer system 6. The local computer system is, for example, a retailer store computer system and may be connected to other computer systems via channels 13. The local computer system 6 is also preferable connected to a central ER computer system 14 having an associated database 16 which acts as a master ER database. The central computer system 14 also includes a terminal 20 and a printer used in connection with its ER functions. The central computer 15 system 14 is also preferably connected to other local computer systems over channels 12, so that it contains registration information from many retail locations covering many different manufacturer's products.

Inasmuch as ER systems are known, and the invention is not directed specifically to an ER system itself, additional specific details regarding ER systems will not be provided herein 20 except as needed for a better understanding of the instant invention.

Figure 2 shows a high level flow chart of a preferred embodiment of the RFID recycling method of the instant invention. As shown in Figure 2, in accordance with the method of the instant invention, the vendors and/or manufacturers put RFID devices on their products prior to shipping the products to a retail location for sale (steps 100 and 102). The 25 RFID device may take any known suitable form such as an RFID tag or other type of tag. While tags operating by RF signals are preferred, other suitable technology that provides a similar identification function may also be used within the scope of the instant invention. In other words, the invention is not limited to RF devices. However, the invention has a preferred application and is particularly advantageous when used with relatively expensive ID devices, 30 such as smart RFID tags, which are intended to be reused. The manufacturer may write or load any desired information (in addition to the unique identifier) onto the device prior to or after attaching the device to the product. The information added is preferably information that the manufacturer desires to have added to the ER database for later reference. After the products

having the RFID devices are ready, the products are shipped in a conventional manner to the retailers that sell the products.

When a retailer receives products having RFID tags, the retailer offers the products for sale along with, for example, other products not having such ID devices. When a product 5 having an RFID device (or other ID device) is brought to the point of sale location for purchase, the sales associate at the store reads the serial number (or other unique identifier) off the product using a scanner, or from the RFID device itself using an RF wand, thereby obtaining the necessary unique identifier for enabling the product to be registered in the transaction database, in the manner described in the electronic registration patents identified 10 above (step 103). In addition to simply reading a unique identifier, such as a serial number, from the product, an advantage of the RFID device is that a variety of additional detailed information (e.g. weight, price, product description, expiration date, etc.) may be provided on the RFID device. In fact, manufacturers could put almost any kind of information on the RFID device that could later be read therefrom in connection with electronic registration either at the 15 point of sale or at another time. In addition, further information could be written to the RFID device at any time, either by the manufacturer, retailer or other authorized party for almost any reason. The information read, including the serial number of the product and a date associated with the product, is then loaded into the ER system, thereby registering the product transaction. The ER system also includes return qualification criteria that is also associated with the 20 transaction information for use in determining return qualification of the product if and when the purchaser attempts to return the product to a retailer for refund, credit or warranty.

In accordance with the invention, the sales associate then also removes the RFID device from the product so that the person who purchased the product can take the product home without the RFID device (step 104). The removed RFID device is then placed in a bin or the 25 like at the retail location for collection with other removed RFID devices from other sold products of various vendors. In this manner, the store will soon collect a significant number of RFID devices, each of which is owned by a particular vendor or another party that may supply the devices to the vendors. In other words, a store will begin to collect a large number of used RFID devices from many different vendors as the sales continue.

30 In accordance with an important aspect of the instant invention, the collected RFID devices are then shipped or sent to an RFID redemption center (step 105). The redemption center then processes the RFID devices by reading information therefrom which indicates where the RFID device originated from. For example, the RFID device could include a vendor

name or other owner unique identifier that identifies a particular party who owns the RFID device. The redemption center then collects all RFID devices for a particular vendor or party, so that the devices can be shipped back to the rightful owner for reuse on other products (step 106). Thus, the redemption center determines who owns what devices by reading the 5 information on the devices, and then separates the devices by owner, so that they can be returned to the rightful owners in bulk.

In accordance with the invention, once the RFID devices are returned to the rightful owner by the redemption center, the retailer is given a credit for the returned devices. For example, the vendor may expect to receive the RFID devices back from the retailer within a 10 certain time after the product having the device thereon has been sold. The electronic registration database could be accessed by the vendor, for example, in order to determine which products have been sold and when, thereby indicating which RFID devices should have been returned. Accounting procedures may be set up whereby the retailer is charged in some manner for not returning the devices within a certain period of time after a product is sold. The 15 redemption center could have access to the registration database to determine what RFID devices should have been returned based on the product transaction data in the registration database. The redemption center could then, for example, invoice the retailer on behalf of the vendor for overdue RFID devices, or could provide reports to the vendor so that the vendor could invoice or otherwise take into account the fact that the devices have not been timely 20 returned. In another embodiment, the retailer may actually pay for the tag when it is provided on a product to the retailer, and then the vendor may credit the retailer back once the RFID device is returned.

It is noted that in a preferred embodiment of the invention, a unique identifier that corresponds to the unique identifier on the RFID device is also provided in a permanent 25 manner on the product itself (either in human readable form or barcode). This enables the unique identifier to be read off the product if and when the product is brought back for possible return by the customer, even though the RFID device has been removed. In other words, in this embodiment of the invention, a corresponding unique identifier is provided on the product itself and on the RFID device attached to the product. Thus, when the product is brought back 30 to the retail location for return, the serial number can be read off the product and submitted to the transaction database, so that a determination can be made as to whether applicable return criteria are met prior to accepting the product for return. As a result, removal of the RFID device at the point of sale does not prevent the electronic registration system from functioning

as described in the above patents. Due to the fact that the unique identifier is provided on the product and by the RFID device, the unique identifier may be obtained either by reading or scanning the unique identifier permanently placed on the product or by reading it from the RFID device using an appropriate RFID reader, such as an RF wand. However, in some 5 applications it may be preferred to use the RFID device, due to that fact that it gives the flexibility to obtain a variety of other information relating to the product itself or the manufacturer, in addition to the serial number.

Figure 3 shows a flow chart of the main steps that a vendor or manufacturer performs in accordance with a preferred embodiment of the RFID recycling method of the instant 10 invention. As explained above, the product vendor (or other party associated with or agent of the vendor) attaches the RFID devices on respective products (step 110) for which the vendor desires to benefit therefrom. The vendor also loads a serial number (or other unique identifier) on each of the devices, either before or after the devices are attached to the products (step 112). As indicated above, the manufacturer also provides a matching serial number permanently on 15 the product. This will enable the serial number to remain on the product after the RFID device is removed. Once the shipment is ready, the products having the RFID tags are shipped to retail locations (step 114). The manufacturer also records the fact that certain RFID devices have been sent to certain retailers. This information is then used to account for the RFID devices eventual return, as well as providing information on who is responsible for the return. 20 Thus, a database is preferably maintained that stores information about the location of and responsibility for the RFID devices. The database information obtained by the manufacturer may also be provided to a service center or redemption center service provider that could be used to provide redemption center services as described herein.

The products are then offered for sale by the retailer and eventually sold (step 118). 25 The retailer's POS system preferably performs electronic registration functions so that the sale is registered in an ER system (step 120). Registration preferably includes obtaining information off the RFID device and storing the information in the ER system. Once the product is registered, the vendor and the retailer enjoy the many benefits of electronic registration of the product transactions. For example, both the vendor and the retailer can use 30 the information to determine whether or not products qualify for return, repair and/or replacement at a particular time, thereby enforcing their return policies in an efficient and highly accurate manner, while also preventing fraud and otherwise improper and costly returns.

The retailer removes the RFID device at the time the product is sold and eventually sends the RFID devices to a redemption center, where they are sorted and returned to the appropriate vendor (step 124). The vendor can then account for return of the devices by, for example, updating the database. The returned RFID devices are then available to be re-used by 5 the vendor. This is done by writing a new serial number to the device and attaching the device to another product prior to sending the new product to the retailer. In this way, the RFID devices can be continually reused by the vendor in an easy, reliable and efficient manner (with the help of the retailer and the redemption center). One significant advantage of this system for the vendor is that it can confidently use relatively expensive and/or sophisticated ID 10 devices on its products.

Figure 4 shows the steps that a retailer (or other sales location) performs in accordance with the preferred embodiment of the RFID recycling method of the instant invention. As explained above, the vendor sends products having the tags to the retailer. The retailer receives the products and offers them for sale (step 130). Tagged products are eventually sold 15 by the retailer (step 132). At the point of sale, the retailer performs the electronic registration functions described herein (step 134). The retailer also removes the RFID tags at the time of sale (step 136). The retailer also reads information from the RFID device at the point of sale, either concurrently or separately from the registration operations, so that information from the device can also be put into the ER system for later reference. Once registered, the retailer (and 20 vendor) enjoy the many benefits of electronic registration of its product transactions. The retailer then periodically (e.g., in batches) sends the removed RFID devices to the redemption center (step 142). It is noted that the retailer may sell products from several different vendors. Thus, the retailer will collect many RFID devices belonging to many different vendors (step 25 144). The retailer simply sends all of the collected devices, regardless of owner, to the redemption center for sorting and eventual return to the rightful vendors. Thus, the retailer can easily and efficiently handle the RFID devices without significant additional burden on its resources or checkout procedures.

Figures 5A and 5B show some of the main steps that the redemption center performs in accordance with the invention. The redemption center plays an important role in connection 30 with the invention, in that it enables retailers to operate and take advantage of the invention without significant additional responsibility or work.

One function performed by the redemption center is shown in Figure 5A. This function involves performing accounting functions in connection with the RFID devices for the owner

thereof or other interested parties. In accordance with this function, the redemption center monitors sales of products having RFID devices thereon so that a determination can be made as to when the RFID devices should be returned to the rightful owner (e.g., the appropriate vendor) for reuse on further products. The redemption center preferably accesses the ER 5 system to obtain this information. The vendor preferably sets policies regarding return of the RFID devices, such as how long after sale of the product that the RFID device should be returned to the vendor. Various RFID related policies are established by various vendors and the redemption center could monitor the RFID devices and provide reports relating thereto. In addition, the redemption center could actually debit/credit certain parties (e.g., retailers) for not 10 returning the RFID devices in a timely manner. The vendor RFID return policies as well as information on the RFID devices that have been issued by vendors are communicated from the vendor to the redemption center (or other third party service provider) that is responsible for monitoring the RFID devices and performing the functions described herein. Thus, this first 15 redemption center function primarily involves management of the RFID devices and accounting in connection with same.

A second function that the redemption center performs is the physical handling and sorting of the RFID devices to be returned to the vendors (or other rightful owners). This function is shown in Figure 5B and involves periodically receiving batches of RFID devices from many different retailers (step 156), wherein each batch includes RFID devices owned by 20 various different parties, such as various vendors. The redemption center sorts the RFID devices into lots according to whom the devices are to be returned to for reuse (step 158). This sorting step is preferably performed by a system that reads the RFID device and determines which lot to put the device into based on the information that is read therefrom. For example, the redemption center could use the database originally generated by the vendor to determine 25 which serial numbers that vendor has used, thereby indicating the owner of a device having a corresponding serial number. Alternatively, the RFID device may include other information, such as the vendor or owners name, address and/or other ID information that enables a determination to be made as to where and/or to whom the device should be returned. When the 30 RFID device is read, the serial number is also used to update a database that keeps track of the RFID devices to indicate that the device has been returned to the redemption center, thereby enabling appropriate accounting for return of the devices (step 160). Once the RFID devices are sorted into lots, the lots are promptly sent to the appropriate owner, so that the owner can reuse the devices on other products (step 162). Thus, the vendor acts as a middle man for the

RFID devices between various retailers and various manufacturers . Thus, as explained above, the redemption center provides important and useful functions for both the retailer and the vendor in connection with the use of the RFID devices. In one embodiment, the ER service provider may also be the redemption center service provider.

5 It is also noted that the invention is particularly advantageous when used with expensive RFID devices, such as devices that can be read from long distances or which can contain a large amount of information. By recycling the devices and accounting for their return, expensive devices can be used by vendors and/or retailers without significantly increasing the cost of the products. This is because the instant invention enables the devices to
10 be reused and accounted for based on the information in the electronic product registration system. While the above description has been directed to the use of the ID recycling method in connection with ER systems, it is noted that the invention may also be used in connection with applications that do not necessarily involve ER. For example, the ID recycling method of the instant invention may be used for any suitable application that involves the use of ID tags that
15 a party desires to eventually have returned for reuse after they have been sent out for some purpose. In addition, additional desired data may be written to or read from the RFID device at any stage of the process and by any of the vendor, retailer or redemption center to provide additional functionality or benefits for any of the parties involved.

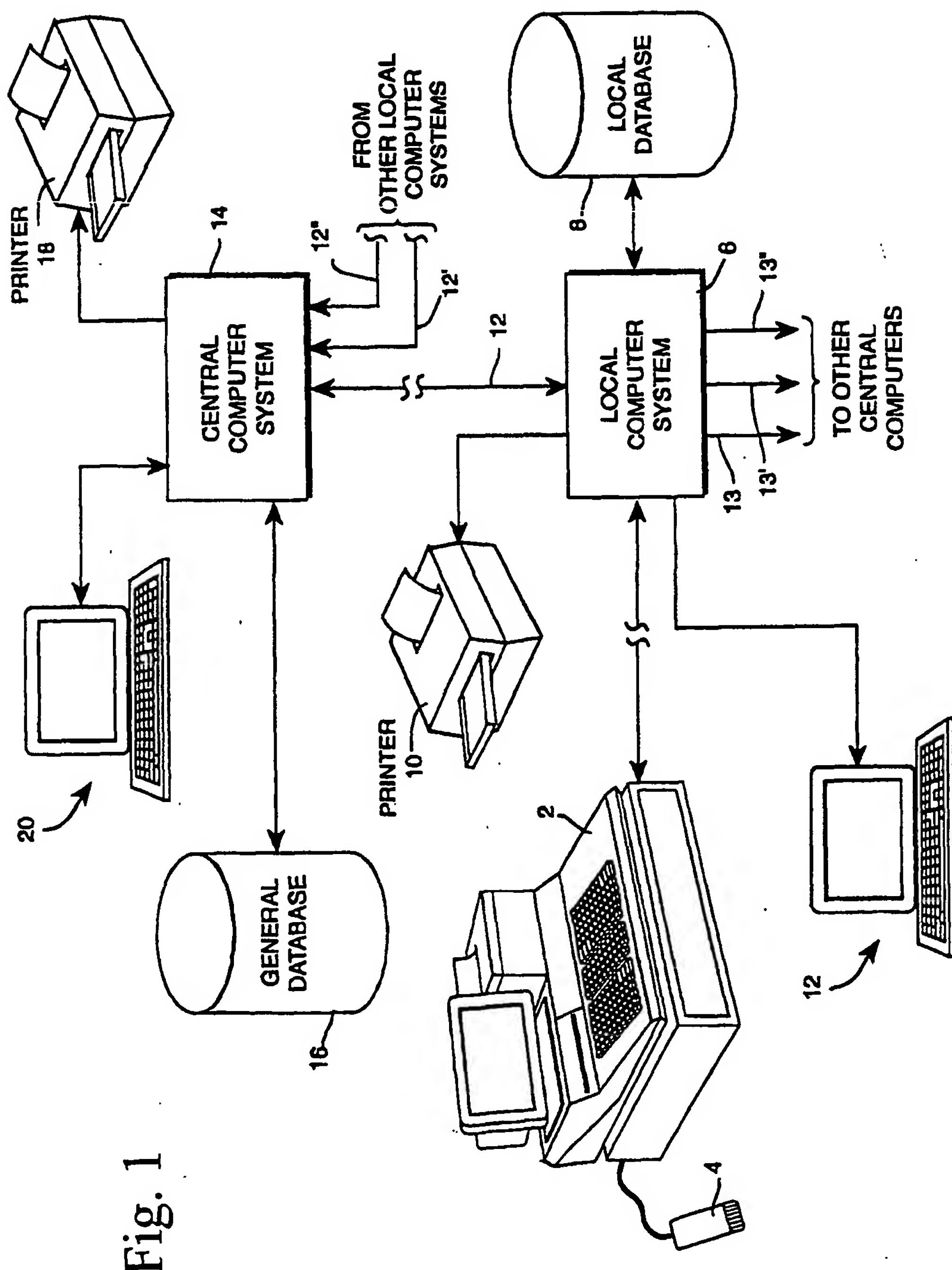
While the invention has been described in connection with the preferred embodiment,
20 various changes and modification may be made without departing from the invention, as one skilled in the art will readily understand from the description herein. Thus, it is not intended that the invention be limited to the specific example embodiments described herein. For example, the invention may have applicability in environments other than the manufacturer/retailer environment described above.

25 While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not to be limited to the disclosed embodiment, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

WHAT IS CLAIMED IS:

- 1 1. A recycling method for product identification devices, comprising:
2 attaching detachable product identification devices to products, wherein each
3 identification device contains machine readable data that uniquely identifies the product to
4 which the identification device is attached;
5 shipping the products having the identification devices thereon to a sales location;
6 removing the identification tag from purchased products at a time and point of sale;
7 reading data from the identification device and using at least some of the data in
8 connection with electronic registration of the product sales transaction;
9 sending removed identification devices to a service location;
10 sorting, at the service location, the removed identification devices into a plurality of
11 batches of identification devices, wherein each batch is associated with a respective party;
12 sending each of the plurality of batches of identification devices to the respective party
13 to which the batch is associated; and
14 reusing the identification devices in connection with other products.
- 1 2. The method of claim 1, wherein sorting the removed identification devices includes
2 reading data from each identification device and using the read data to determine in which
3 batch out of the plurality of batches each identification device belongs.
- 1 3. The method of claim 1, further including using RFID devices as the identification
2 devices.
- 1 4. The method of claim 1, further including loading the machine readable data that
2 uniquely identifies the product on the identification device.
- 1 5. The method of claim 1, wherein the machine readable data is defined such that it
2 corresponds to a unique identifier that is provided on the product.
- 1 6. The method of claim 1, wherein reading data from the identification device includes
2 reading a serial number from the identification device.
- 1 7. The method of claim 6, wherein the read serial number is used as the unique
2 identifier for the electronic product registration of product sale.

- 1 8. A recycling method for reusable product identification devices, comprising:
2 monitoring sales of products having reusable product identification devices;
3 determining, based on monitored sales, when the product identification devices
4 should be returned to a party;
5 monitoring the return of the identification devices; and
6 performing accounting functions in connection with the return of the identification
7 devices.
- 1 9. The method of claim 8, wherein monitoring sales of products includes accessing an
2 electronic product registration system to determine when a product was sold.
- 1 10. The method of claim 8, wherein determining when the product identification
2 devices should be returned includes using predefined identification device return policies.
- 1
- 2 11. The method of claim 8, wherein performing accounting functions includes
3 providing reports to interested parties with respect to status of the identification devices.
- 2 12. The method of claim 8, wherein performing accounting functions includes
3 generating invoices issued based on non-compliance with an identification device return
4 policy.
- 1 13. The method of claim 8, wherein performing accounting functions includes at least
2 one of debiting and crediting of parties based on compliance or non-compliance with
3 identification device return policies.
- 1 14. The method of claim 8, wherein the identification devices are RFID tags.
- 1 15. The method of claim 8, wherein monitoring return of the identification devices
2 includes accounting for the return during an identification device sorting process.
- 1 16. The method of claim 15, wherein the identification device return process includes
2 reading identification information from the identification device for use in determining rightful
3 ownership of the identification device.



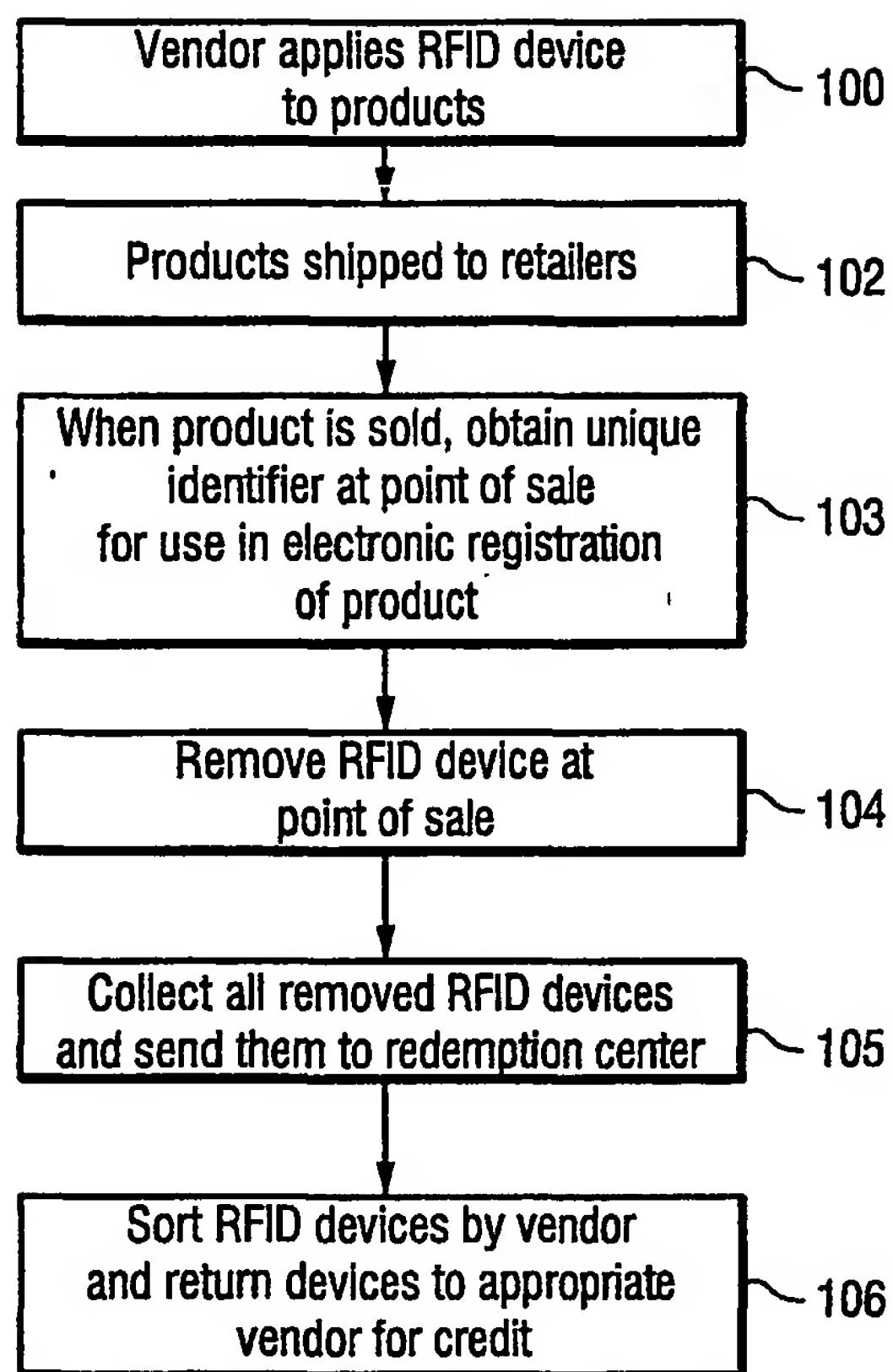


Fig. 2

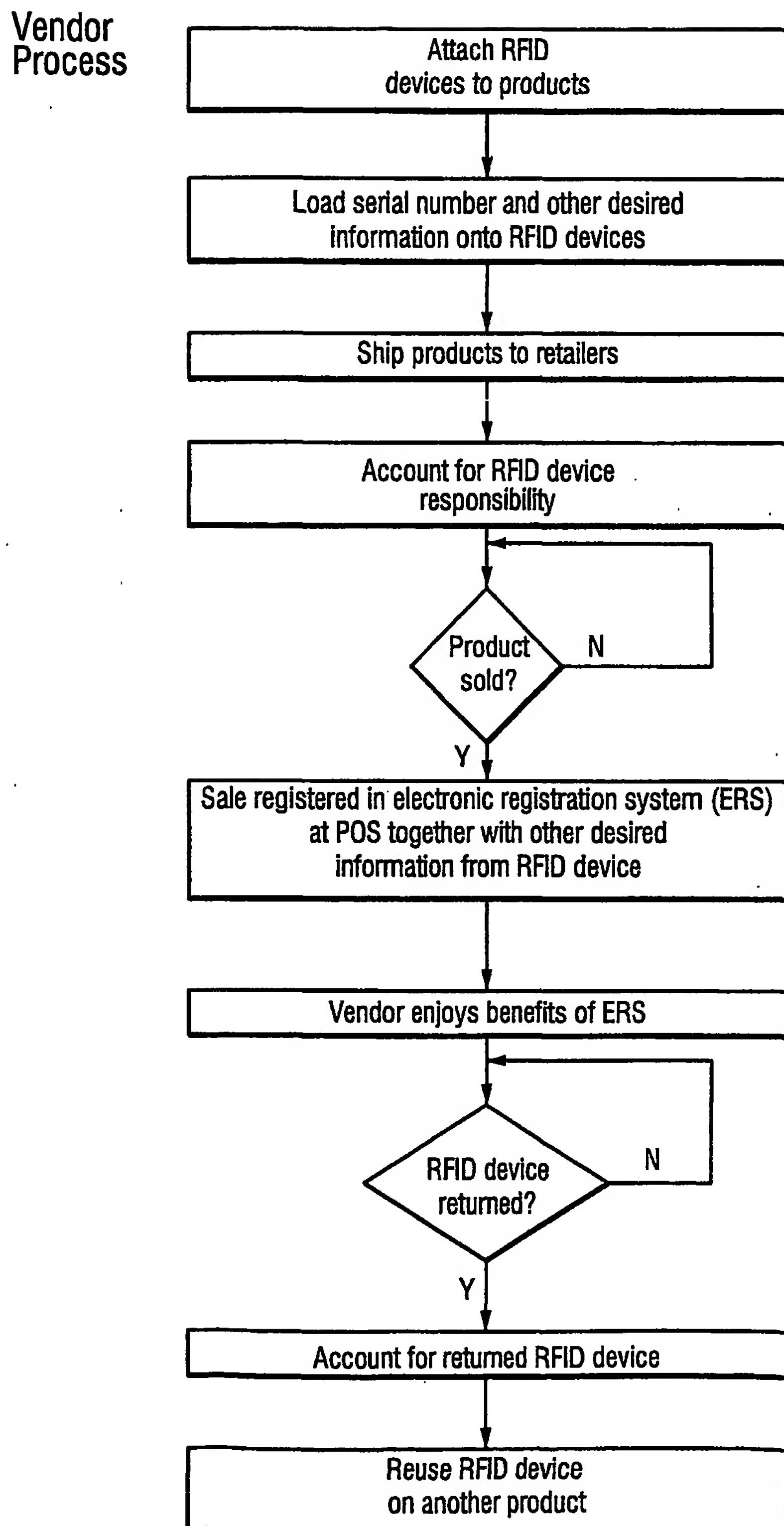
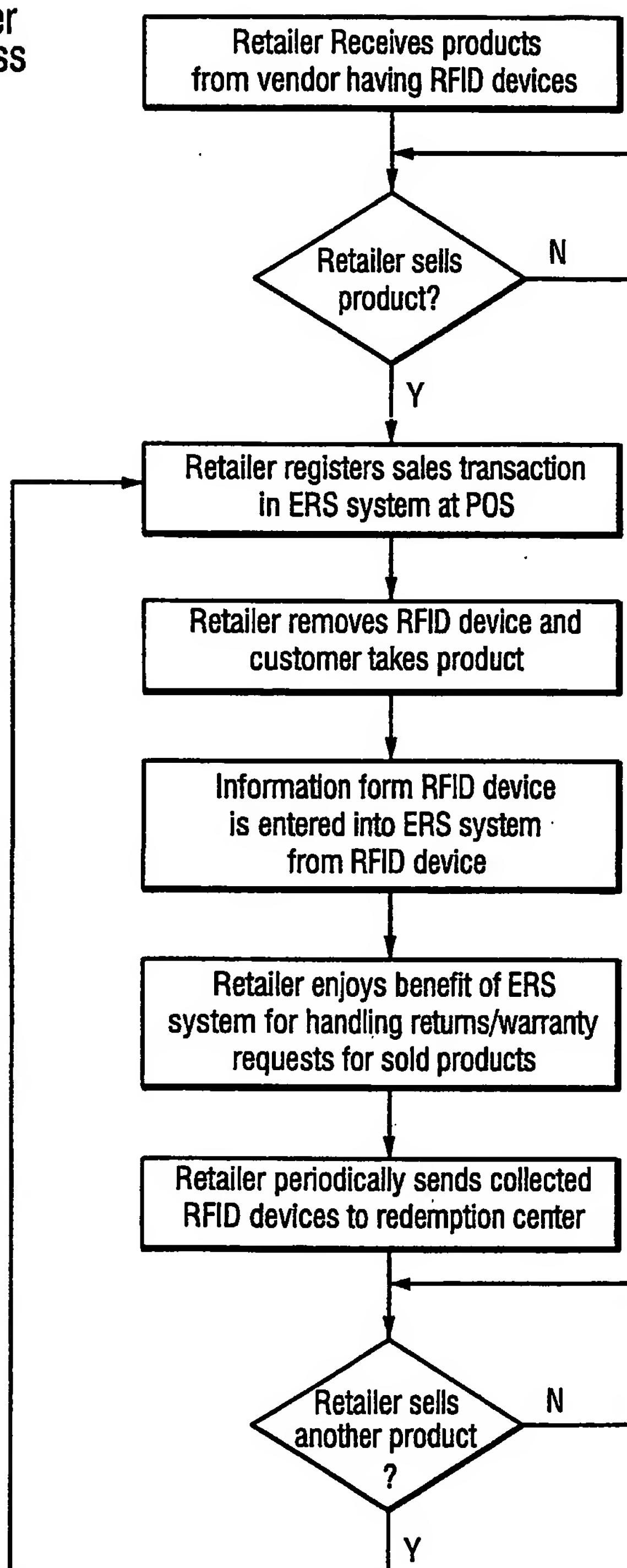


Fig. 3

Retailer Process**Fig. 4**

Redemption Center Processes

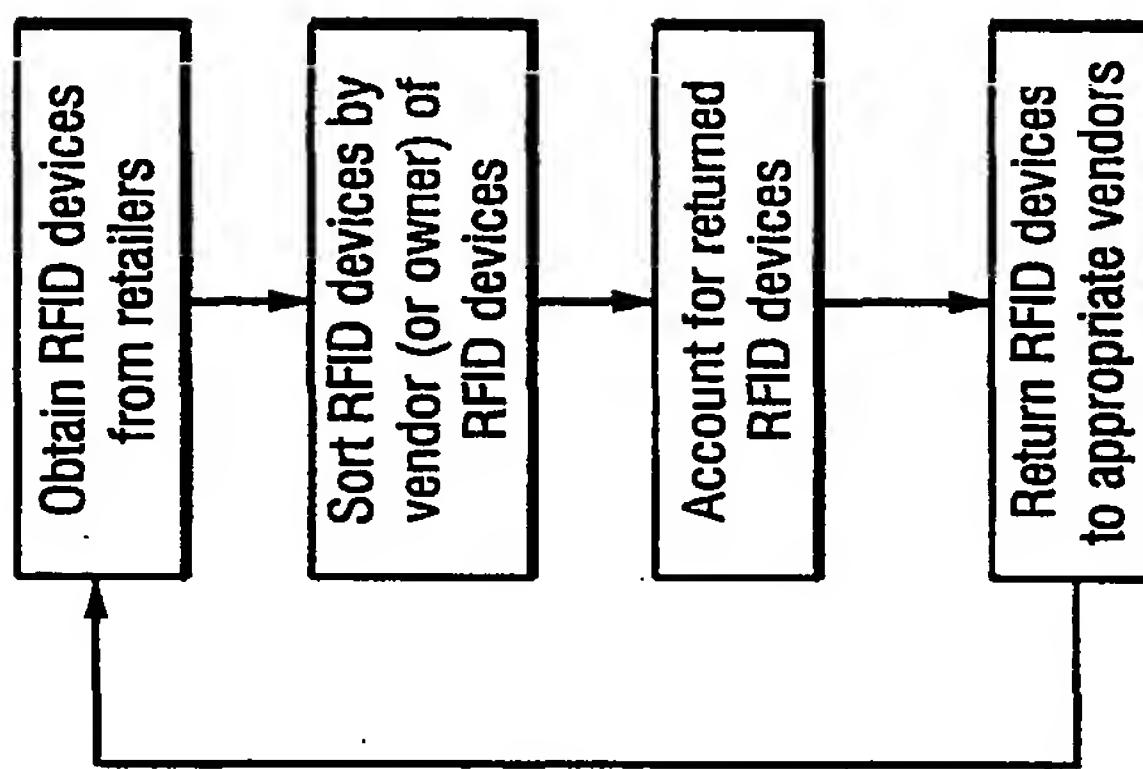


Fig. 5B

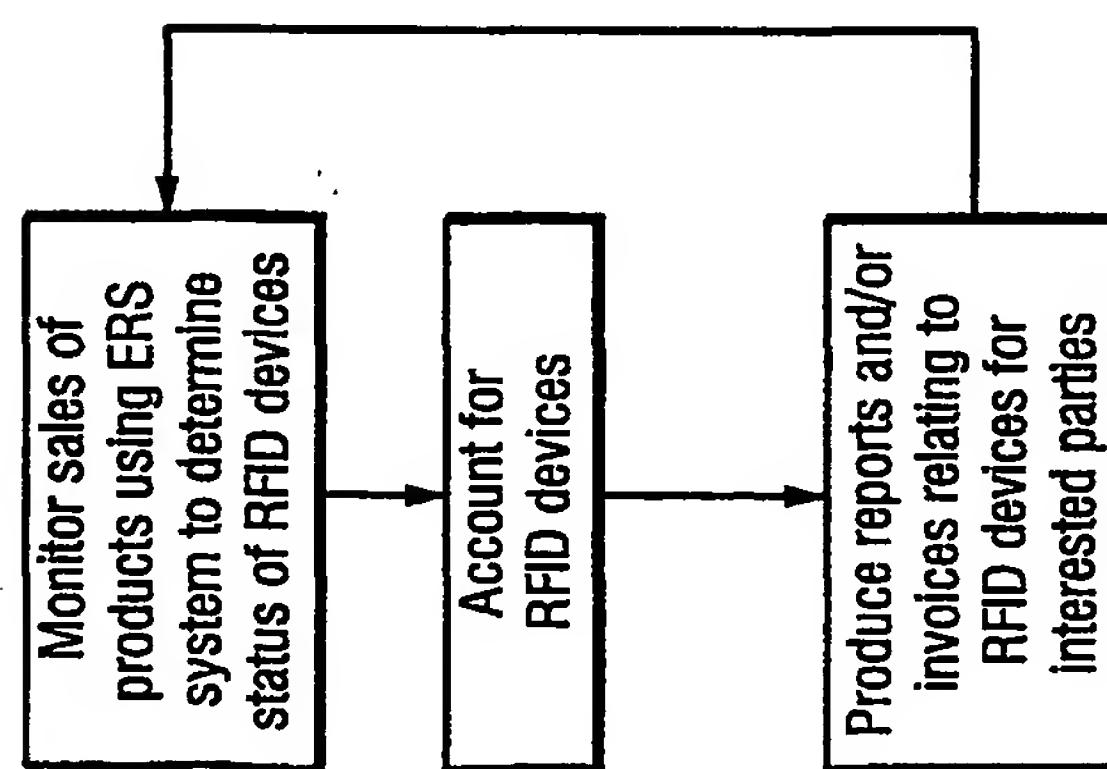


Fig. 5A

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/48018

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06F 17/60
US CL : 705/16, 21, 22, 23, 28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 705/16, 21, 22, 23, 28

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,P	US 6,313,745 B1 (SUZUKI) 06 November 2001, all.	1-16
A	US 5,986,562 A (NIKOLICH) 16 November 1999, see all	1-16
A,P	US 6,281,795 B1 (SMITH et al) 28 August 2001, see all	1-16
A,P	US 6,206,282 B1 (HAYES, SR. et al) 27 March 2001	1-16
A	US 5,745,036 A (CLARE) 28 April 1998	1-16

 Further documents are listed in the continuation of Box C. See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search	Date of mailing of the international search report
18 MARCH 2002	11 APR 2002

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